

Metal Oxide Chip Varistor Surge Protection type 85°C

MVS-T Series

MERITEK

FEATURE

- Operating Temperature: -40°C ~ +85°C
- Operating Voltage: 5. 5Vdc ~ 85 Vdc
- High surge suppress capability
- Bidirectional and symmetrical V/I characteristics
- Multilayer ceramic construction technology
- Variable capacitance
- Applications: power system, motherboard/notebook computer, scanner, handheld devices, digital video, set-top box



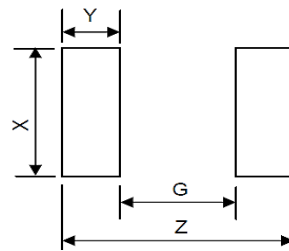
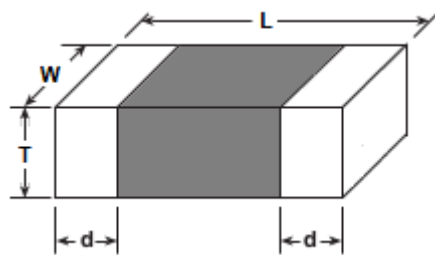
PART NUMBERING SYSTEM



MVS **0402** **T** **080** **M**
(1) (2) (3) (4) (5)

No	Item	Code	Description	Series Reference
(1)	Meritek Series	MVS	Metal Oxide Varistor	Surface Mount type
(2)	Size Code	0402	1.00x0.50x0.60 (mm)	See Dimension Table below
(3)	Product Code	T	T: Surge Protection type	-40°C ~ +85°C
(4)	Varistor Voltage	080	080: 8V	First two significant, Third: Multiplier
(5)	Varistor Tolerance	M	±20%	L: ±15%, K: ±10%

DIMENSION AND SOLDERING PAD



Unit: mm

Part Series	EIA	L1	W	T max	d	Z	G	X	Y
MVS0402T	0402	1.00±0.15	0.50±0.10	0.6	0.20±0.10	1.7	0.5	0.6	0.6
MVS0603T	0603	1.60±0.15	0.80±0.15	0.95	0.35±0.15	3.0	1.0	1.0	1.0
MVS0805T	0805	2.00±0.20	1.25±0.20	1.0	0.40±0.20	3.4	1.0	1.4	1.2
MVS1206T	1206	3.20±0.30	1.60±0.20	1.5	0.50±0.20	4.5	2.1	1.8	1.2
MVS1210T	1210	3.20±0.30	2.50±0.25	1.5	0.50±0.20	4.5	2.1	2.8	1.2
MVS1812T	1812	4.50±0.40	3.20±0.30	1.5	0.60±0.30	6.0	3.0	3.6	1.5
MVS2220T	2220	5.70±0.40	5.00±0.30	2.0	0.60±0.30	7.2	4.2	5.5	1.5
MVS3025T	3025	7.50±0.50	6.30±0.40	2.5	0.60±0.30	9.0	6.0	5.5	1.5

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ELECTRICAL CHARACTERISTICS

MVS0402T Series	Varistor Voltage		Max Allowable Voltage		Max. Clamping Voltage		Surge Current	Max. Energy	Rate Power	Typical Capacitance
	V _{1mA}	ΔV _{1mA}	V _{ACrm}	V _{DC}	V _p	I _p	8/20 μs	10/10kμs	(W)	At 1KHz
	(V)	(±%)	(V)	(V)	(V)	(A)	(A)	(J)		(pF)
MVS0402T080M	8	20	4	5.5	19	1	10	0.05	0.003	230
MVS0402T110M	11	20	6	8.0	27	1	10	0.05	0.003	160
MVS0402T12RM	12.5	20	7	9.0	30	1	10	0.05	0.003	140
MVS0402T150L	15	15	8	11	33	1	10	0.05	0.003	120
MVS0402T180K	18	10	11	14	35	1	10	0.05	0.003	80
MVS0402T220K	22	10	14	18	44	1	10	0.05	0.003	60
MVS0402T270K	27	10	17	22	55	1	10	0.05	0.003	50
MVS0402T330K	33	10	20	26	63	1	10	0.05	0.003	40

MVS0603T Series	Varistor Voltage		Max Allowable Voltage		Max. Clamping Voltage		Surge Current	Max. Energy	Rate Power	Typical Capacitance
	V _{1mA}	ΔV _{1mA}	V _{ACrms}	V _{DC}	V _p	I _p	8/20 μs	10/10kμs	(W)	At 1KHz
	(V)	(±%)	(V)	(V)	(V)	(A)	(A)	(J)		(pF)
MVS0603T080M	8	20	4	5.5	19	1	30	0.1	0.003	950
MVS0603T110M	11	20	6	8.0	27	1	30	0.1	0.003	600
MVS0603T12RM	12.5	20	7	9.0	30	1	30	0.1	0.003	570
MVS0603T150L	15	15	8	11	33	1	30	0.1	0.003	520
MVS0603T180K	18	10	11	14	35	1	30	0.2	0.003	420
MVS0603T220K	22	10	14	18	40	1	30	0.2	0.003	300
MVS0603T270K	27	10	17	22	46	1	30	0.2	0.003	180
MVS0603T330K	33	10	20	26	56	1	30	0.3	0.003	150
MVS0603T390K	39	10	25	31	67	1	30	0.3	0.003	100

MVS0805T Series	Varistor Voltage		Max Allowable Voltage		Max. Clamping Voltage		Surge Current	Max. Energy	Rate Power	Typical Capacitance
	V _{1mA}	ΔV _{1mA}	V _{ACrm}	V _{DC}	V _p	I _p	8/20 μs	10/10kμs	(W)	At 1KHz
	(V)	(±%)	(V)	(V)	(V)	(A)	(A)	(J)		(pF)
MVS0805T080M	8	20	4	5.5	19	1	60	0.1	0.005	1500
MVS0805T110M	11	20	6	8.0	27	1	60	0.2	0.005	1400
MVS0805T12RM	12.5	20	7	9.0	29	1	60	0.2	0.005	1100
MVS0805T150L	15	15	8	11	33	1	60	0.2	0.005	950
MVS0805T180K	18	10	11	14	35	1	60	0.2	0.005	670
MVS0805T220K	22	10	14	18	40	1	60	0.3	0.005	430
MVS0805T270K	27	10	17	22	46	1	60	0.3	0.005	330
MVS0805T330K	33	10	20	26	56	1	60	0.3	0.005	300
MVS0805T390K	39	10	25	31	67	1	60	0.3	0.005	180
MVS0805T470K	47	10	30	38	77	1	60	0.3	0.005	150

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ELECTRICAL CHARACTERISTICS (CONTINUES)

MVS1206T Series	Varistor Voltage		Max Allowable Voltage		Max. Clamping Voltage		Surge Current	Max. Energy	Rate Power	Typical Capacitance
	V _{1mA}	ΔV _{1mA}	V _{ACrm}	V _{DC}	V _p	I _p	8/20 μs	10/10kμs	(W)	At 1KHz
	(V)	(±%)	(V)	(V)	(V)	(A)	(A)	(J)		(pF)
MVS1206T080M	8	20	4	5.5	17	1	150	0.3	0.008	4800
MVS1206T110M	11	20	6	8.0	25	1	200	0.4	0.008	3900
MVS1206T150L	15	15	8	11	30	1	200	0.5	0.008	2500
MVS1206T180K	18	10	11	14	33	1	200	0.5	0.008	1500
MVS1206T220K	22	10	14	18	42	1	200	0.5	0.008	1200
MVS1206T270K	27	10	17	22	48	1	200	0.6	0.008	1000
MVS1206T330K	33	10	20	26	54	1	200	0.7	0.008	800
MVS1206T390K	39	10	25	31	65	1	200	1.0	0.008	650
MVS1206T470K	47	10	30	38	77	1	200	1.1	0.008	380
MVS1206T560K	56	10	35	45	90	1	100	0.4	0.008	300
MVS1206T680K	68	10	40	56	110	1	100	0.5	0.008	250
MVS1206T820K	82	10	50	65	135	1	100	0.6	0.008	180
MVS1206T101K	100	10	60	85	146	1	100	0.7	0.008	150

MVS1210T Series	Varistor Voltage		Max Allowable Voltage		Max. Clamping Voltage		Surge Current	Max. Energy	Rate Power	Typical Capacitance
	V _{1mA}	ΔV _{1mA}	V _{ACrm}	V _{DC}	V _p	I _p	8/20 μs	10/10kμs	(W)	At 1KHz
	(V)	(±%)	(V)	(V)	(V)	(A)	(A)	(J)		(pF)
MVS1210T080M	8	20	4	5.5	17	2.5	250	0.4	0.010	8200
MVS1210T110M	11	20	6	8.0	25	2.5	300	0.7	0.010	7500
MVS1210T150L	15	15	8	11	30	2.5	400	1	0.010	4800
MVS1210T180K	18	10	11	14	33	2.5	400	1.2	0.010	2900
MVS1210T220K	22	10	14	18	38	2.5	400	1.5	0.010	2400
MVS1210T270K	27	10	17	22	44	2.5	400	1.7	0.010	2000
MVS1210T330K	33	10	20	26	54	2.5	400	1.9	0.010	1300
MVS1210T390K	39	10	25	31	65	2.5	300	1.7	0.010	1000
MVS1210T470K	47	10	30	38	77	2.5	300	2.0	0.010	900
MVS1210T560K	56	10	35	45	90	2.5	250	2.0	0.010	600
MVS1210T680K	68	10	40	56	110	2.5	250	2.3	0.010	450
MVS1210T820K	82	10	50	65	135	2.5	200	1.6	0.010	300
MVS1210T101K	100	10	60	85	165	2.5	200	2.0	0.010	160

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ELECTRICAL CHARACTERISTICS (CONTINUES)

MVS1812T Series	Varistor Voltage		Max Allowable Voltage		Max. Clamping Voltage		Surge Current	Max. Energy	Rate Power	Typical Capacitance
	V _{1mA}	ΔV _{1mA}	V _{ACrm}	V _{DC}	V _p	I _p	8/20 μs	10/10kμs	(W)	At 1KHz
	(V)	(±%)	(V)	(V)	(V)	(A)	(A)	(J)		(pF)
MVS1812T080M	8	20	4	5.5	17	5	500	0.8	0.015	18000
MVS1812T110M	11	20	6	8.0	25	5	500	1	0.015	15000
MVS1812T150L	15	15	8	11	30	5	800	1.8	0.015	10000
MVS1812T180K	18	10	11	14	33	5	800	1.9	0.015	5500
MVS1812T220K	22	10	14	18	38	5	800	2.3	0.015	5000
MVS1812T270K	27	10	17	22	44	5	800	2.7	0.015	4000
MVS1812T330K	33	10	20	26	54	5	800	3.0	0.015	3200
MVS1812T390K	39	10	25	31	65	5	800	3.7	0.015	2500
MVS1812T470K	47	10	30	38	77	5	800	4.2	0.015	2000
MVS1812T560K	56	10	35	45	90	5	500	4.0	0.015	1200
MVS1812T680K	68	10	40	56	110	5	500	4.8	0.015	1000
MVS1812T820K	82	10	50	65	135	5	400	4.5	0.015	600
MVS1812T101K	100	10	60	85	165	5	400	5.8	0.015	300

MVS2220T/ MVS3025T Series	Varistor Voltage		Max Allowable Voltage		Max. Clamping Voltage		Surge Current	Max. Energy	Rate Power	Typical Capacitance
	V _{1mA}	ΔV _{1mA}	V _{ACrm}	V _{DC}	V _p	I _p	8/20 μs	10/10kμs	(W)	At 1KHz
	(V)	(±%)	(V)	(V)	(V)	(A)	(A)	(J)		(pF)
MVS2220T080M	8	20	4	5.5	17	10	1000	1.4	0.020	29000
MVS2220T110M	11	20	6	8.0	25	10	1200	3.6	0.020	25000
MVS2220T150L	15	15	8	11	30	10	1200	4.2	0.020	18000
MVS2220T180K	18	10	11	14	33	10	1200	5.4	0.020	12000
MVS2220T220K	22	10	14	18	38	10	1200	5.8	0.020	10000
MVS2220T270K	27	10	17	22	44	10	1200	7.2	0.020	7700
MVS2220T330K	33	10	20	26	54	10	1200	7.8	0.020	5800
MVS2220T390K	39	10	25	31	65	10	1200	9.6	0.020	4100
MVS2220T470K	47	10	30	38	77	10	1200	12.0	0.020	3000
MVS2220T560K	56	10	35	45	90	10	1000	7.7	0.020	2000
MVS2220T680K	68	10	40	56	110	10	1000	9.0	0.020	1500
MVS2220T820K	82	10	50	65	135	10	800	5.6	0.020	1000
MVS2220T101K	100	10	60	85	165	10	800	6.8	0.020	600

MVS3025T390K	39	10	25	31	70	5	250	3.0	0.020	700
MVS3025T560K	56	10	35	45	105	5	250	3.0	0.020	600
MVS3025T680K	68	10	40	56	125	5	250	3.0	0.020	600

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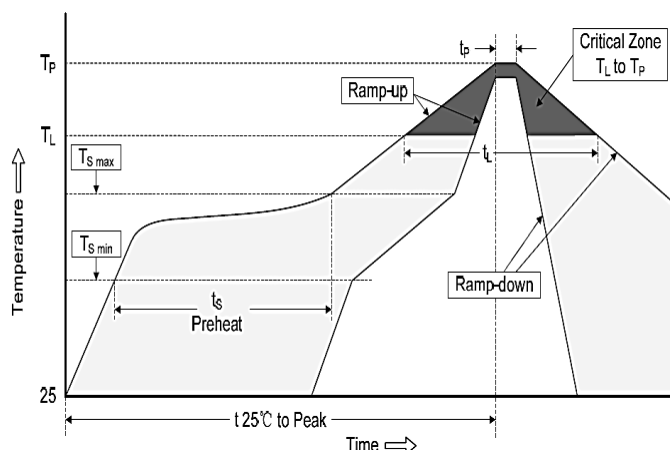
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RELIABILITY TEST CONDITON AND REQUIREMENT

Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp: 2mm ;Speed<0.5mm/sec Duration: 10 sec on PCB 	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Adhesion	Specification Standard	Speed<0.5mm/sec on PCB 	$\geq 0.5\text{Kgf}$ the terminal electrode shall be broke off not the chip element															
Damp Heat Load, Steady State	IEC 60068-2-78	40±2°C 90~95% RH , 500±24 hrs at VDC	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage															
High Temp. Storage	IEC 61051-1	125±5 °C x 1000±24 hrs	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Rapid Change of Temperature	IEC 61051-1	The conditions shown below shall be repeated 5 cycles on PCB. <table><tr><th>Step</th><th>Temperature (°C)</th><th>Period (minutes)</th></tr><tr><td>1</td><td>-40±3</td><td>30±3</td></tr><tr><td>2</td><td>Room temperature</td><td>5±3</td></tr><tr><td>3</td><td>125±2</td><td>30±3</td></tr><tr><td>4</td><td>Room temperature</td><td>5±3</td></tr></table>	Step	Temperature (°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	5±3	3	125±2	30±3	4	Room temperature	5±3	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage
Step	Temperature (°C)	Period (minutes)																
1	-40±3	30±3																
2	Room temperature	5±3																
3	125±2	30±3																
4	Room temperature	5±3																
High Temp. Load	IEC 61051-1	85±2 °C 1000±24 hrs at V _{DC}	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Low Temp. Load	Specification Standard	-40±5 °C 1000±24 hrs at V	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Max. Energy	Specification Standard	10/1000µs Waveform, W _{max} , 1 surge current	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage															
Vibration	IEC 61051-1	Frequency range: 10~55Hz, Amplitude: 0.75mm or 98m/s ² , Direction: 3 mutually perpendicular directions, 2 hrs each	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Varistor Voltage Temp. Coefficient	Specification Standard	Measure V _{1mA} at -40°C, 25°C, 125°C	$ T_c \leq 0.05 (\%/^{\circ}\text{C})$															
Climatic Sequence	IEC 61051-1	125°C x 16 hrs, 1st cycle : 55°C 93%RH x 24 hrs, -40°C x 2 hrs, 5 cycles : 55°C 93%RH x 24 hrs/cycle	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage															
Solderability	IEC 60068-2-58	245±5°C 3±0.3 sec.	At least 95% of terminal electrode is covered															
Resistance to Soldering Heat	IEC 60068-2-20	260±5°C 10±1 sec.	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															

SOLDERING RECOMMENDATION

Reflow Condition		
Pre Heat	Temp. Min T _{s(min)}	150°C
	Temp. Max T _{s(max)}	200°C
	Time (min. to max.) (t _s)	60~180 seconds
Average ramp up rate (Liquids		3°C/second max.
T _{s(max)} to T _L (Ramp-up rate)		3°C/second max.
Reflow	Temp. (T _L)	217°C
	Time (t _L) (min. to max.)	60~150 seconds
Peak Temperature (T _P)		260°C
Time within 5°C of actual peak		40 seconds max
Ramp-down Rate		6°C/second max.

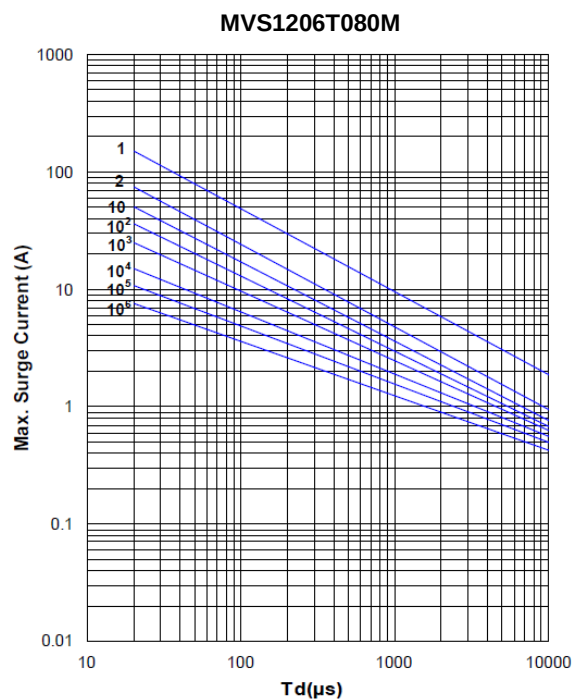
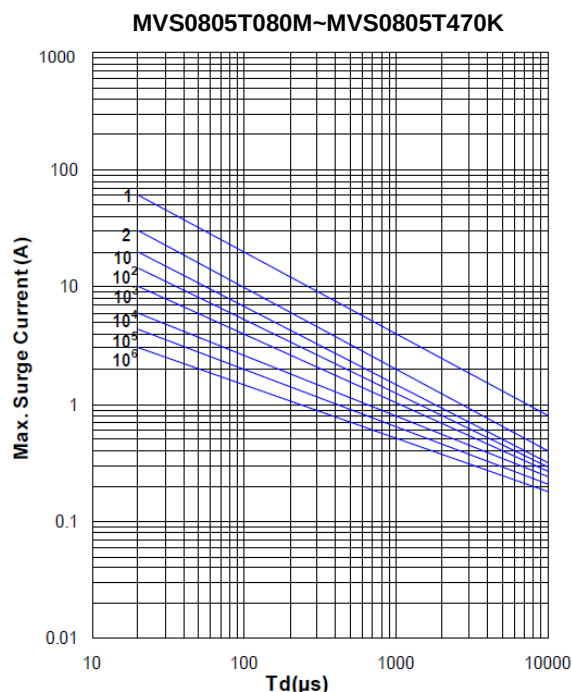
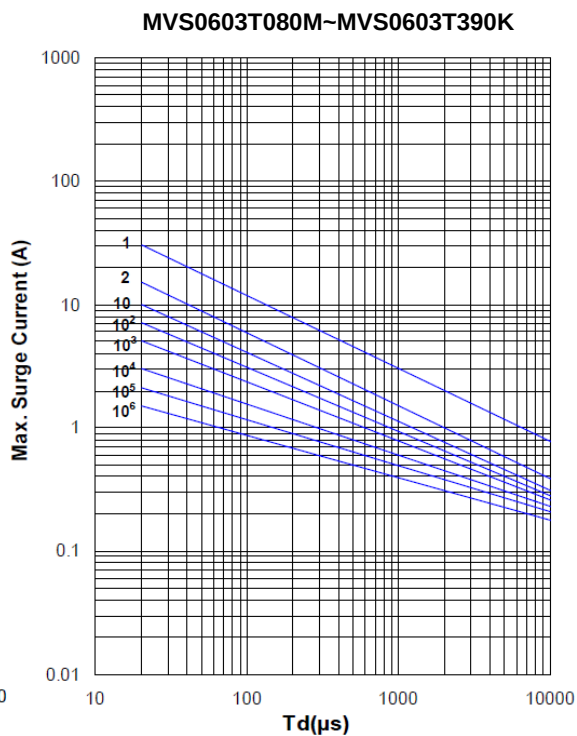
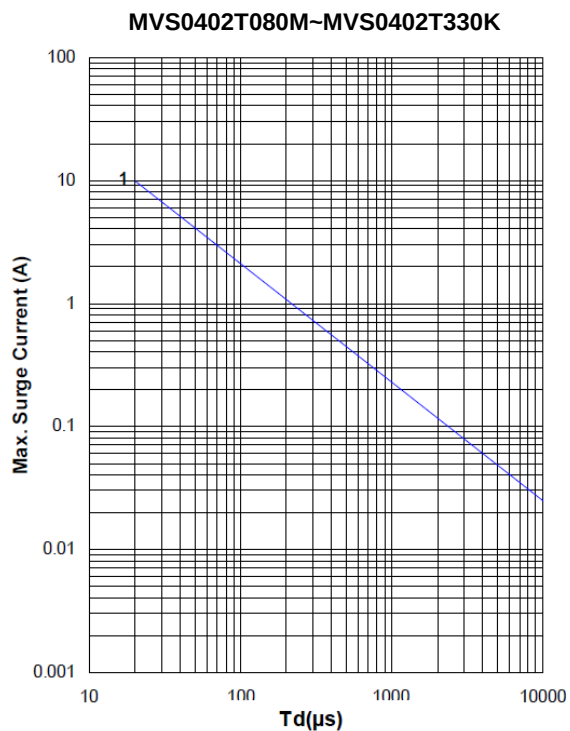


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MAX. SURGE CURRENT DERATING CURVES

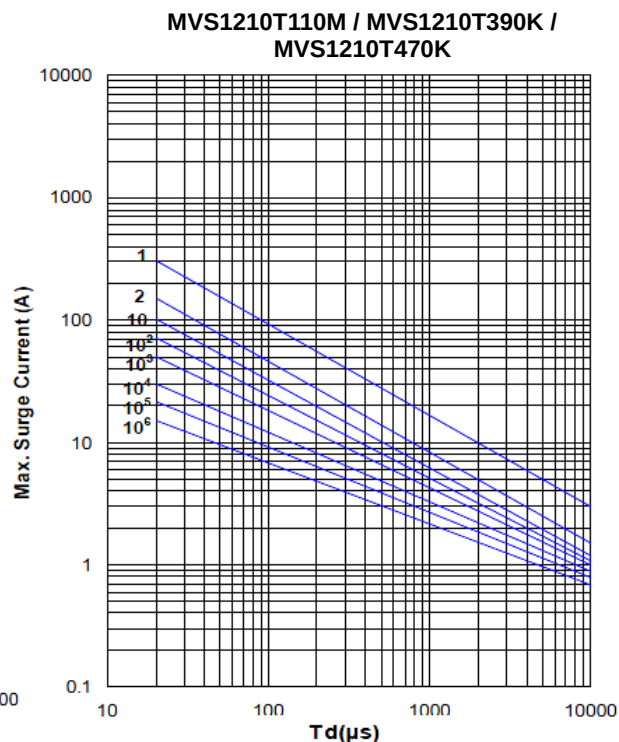
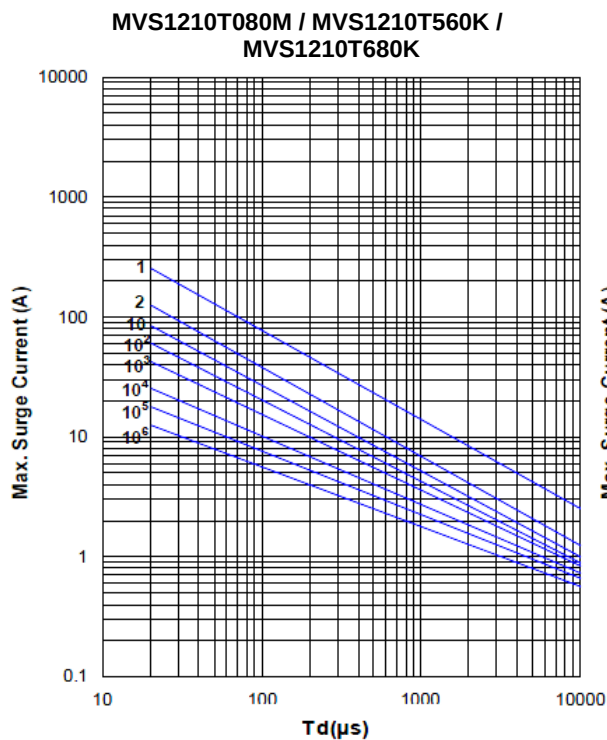
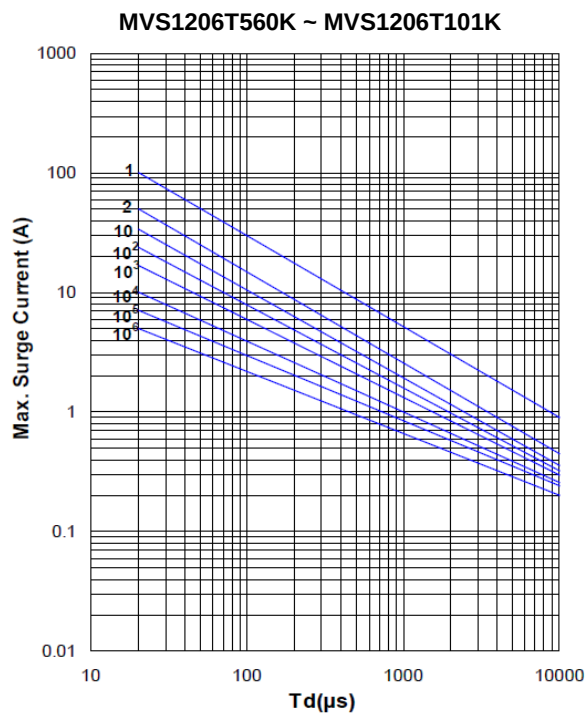
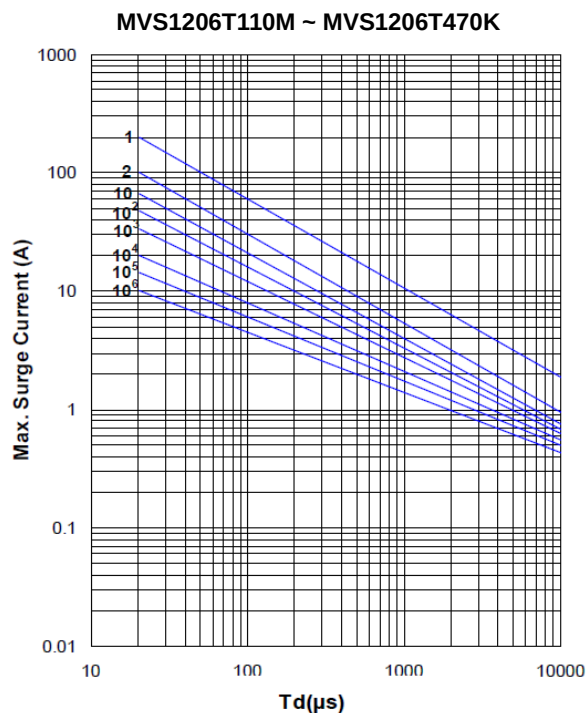


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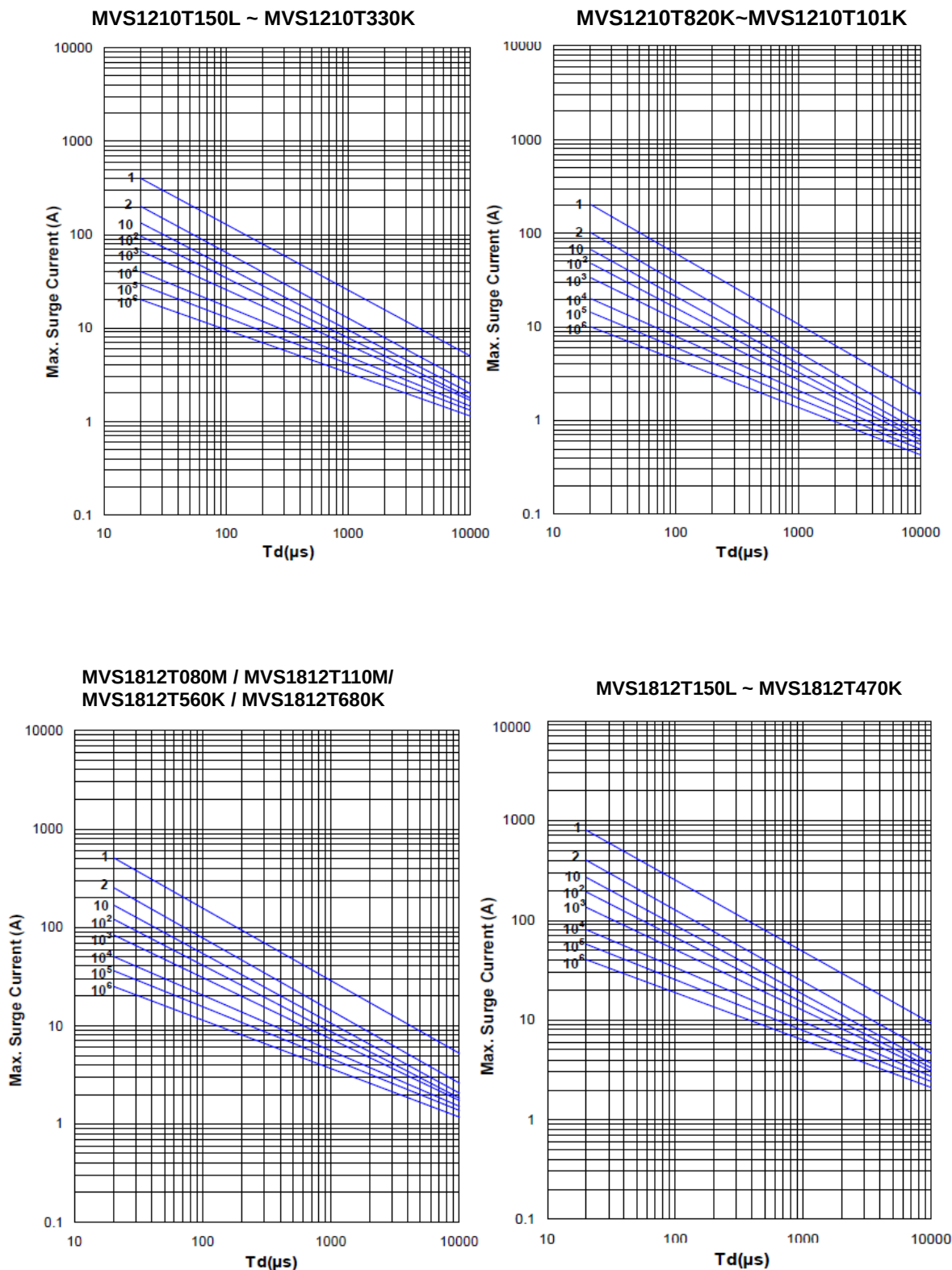
MVS-T Series

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MAX. SURGE CURRENT DERATING CURVES



MAX. SURGE CURRENT DERATING CURVES

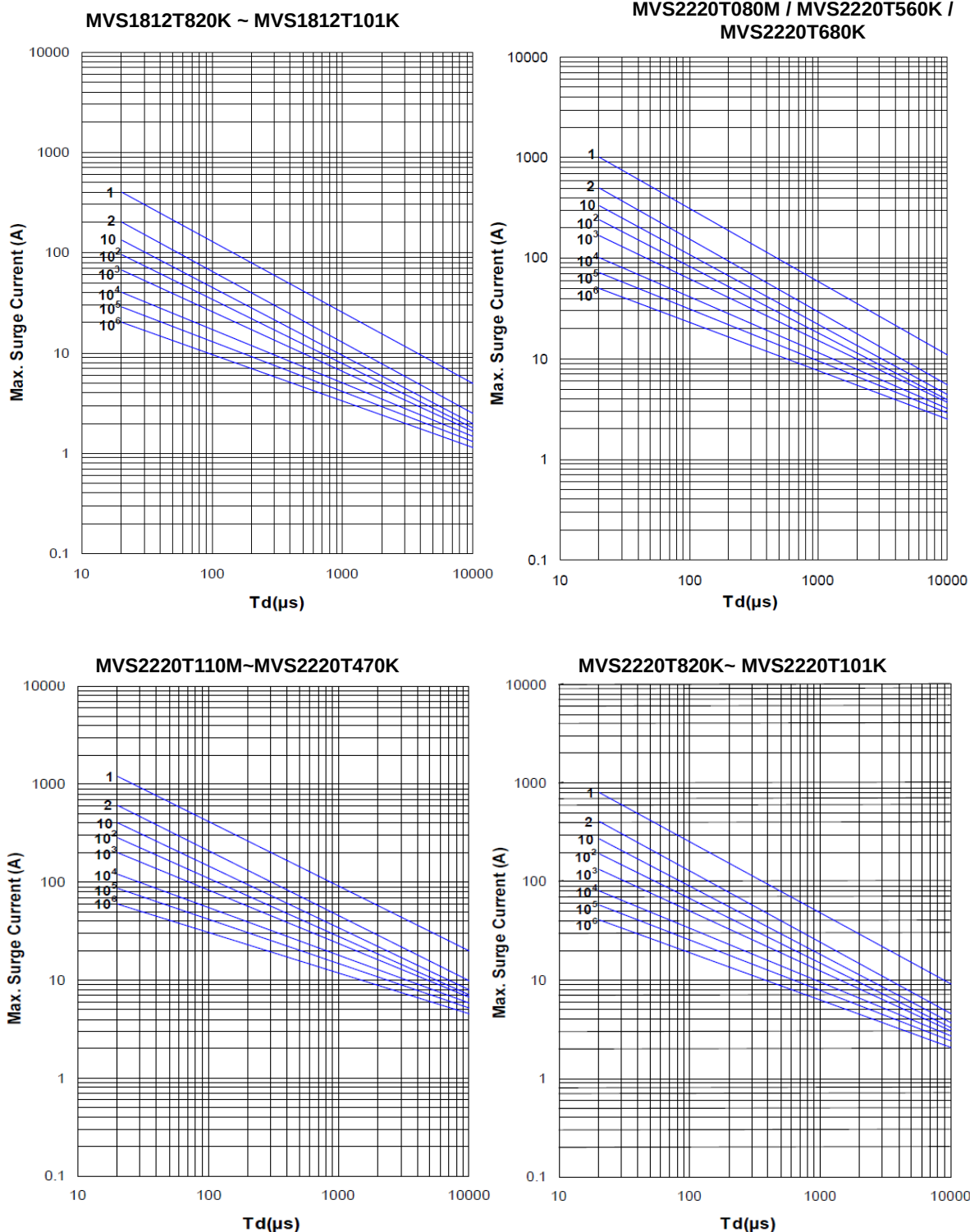


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MAX. SURGE CURRENT DERATING CURVES

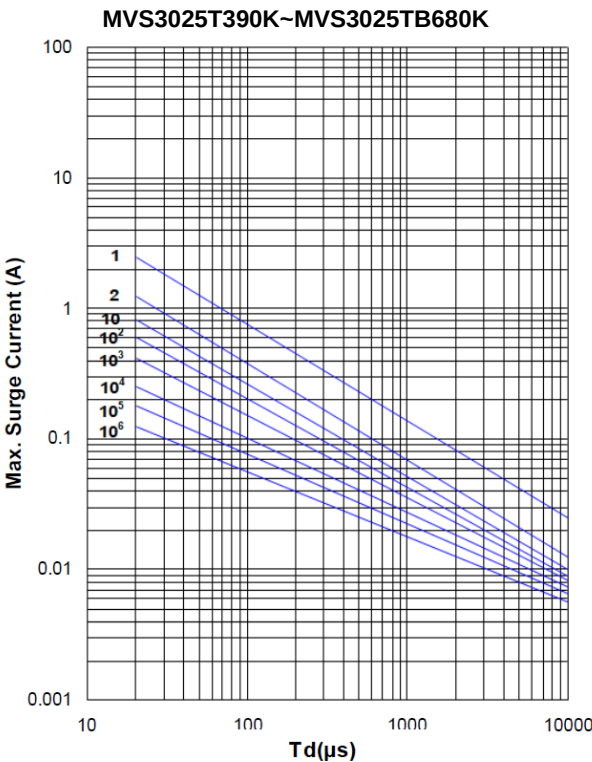


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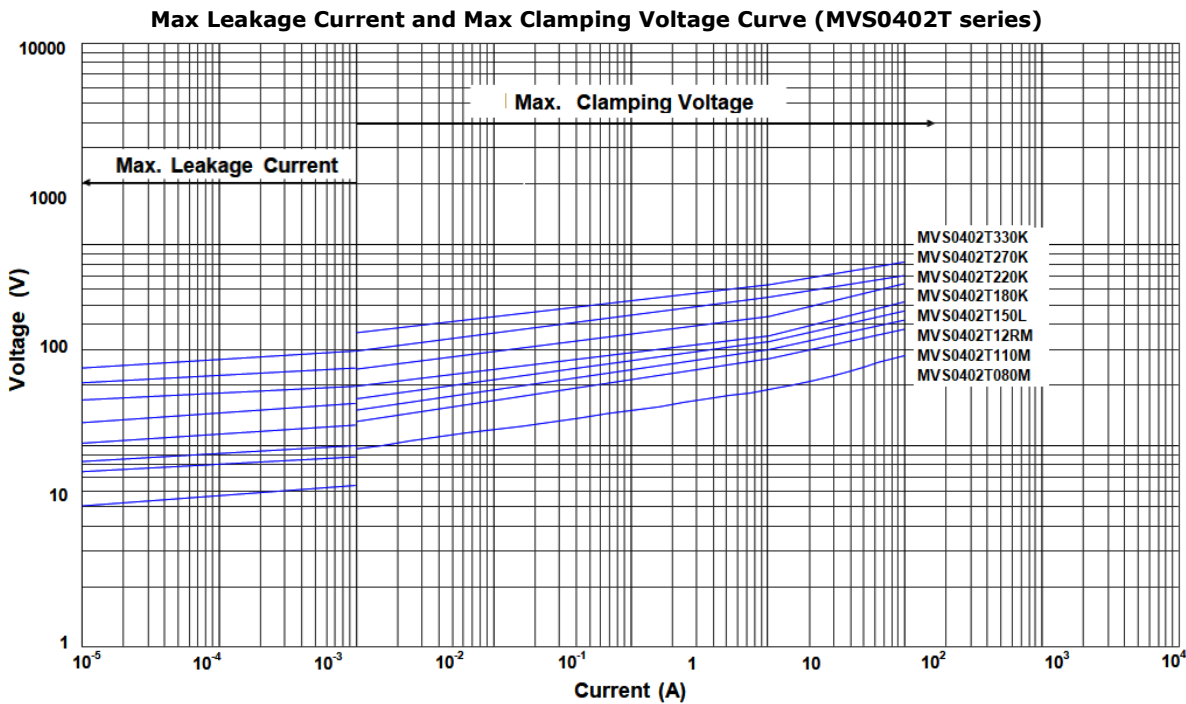
MVS-T Series

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MAX. SURGE CURRENT DERATING CURVES



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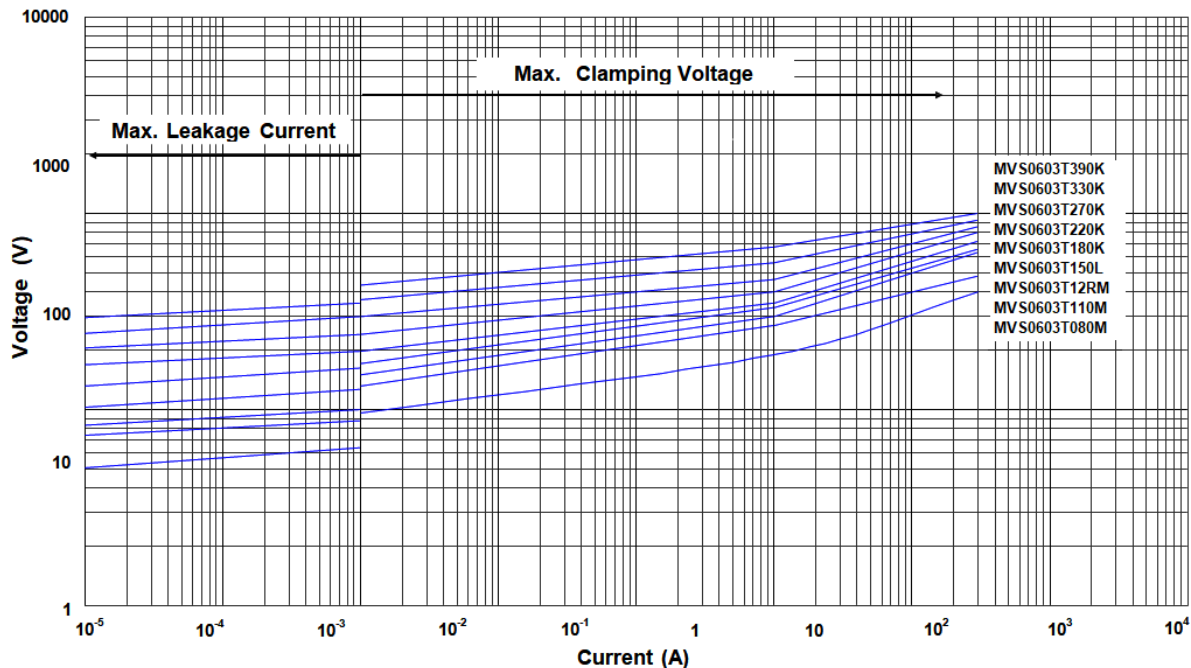
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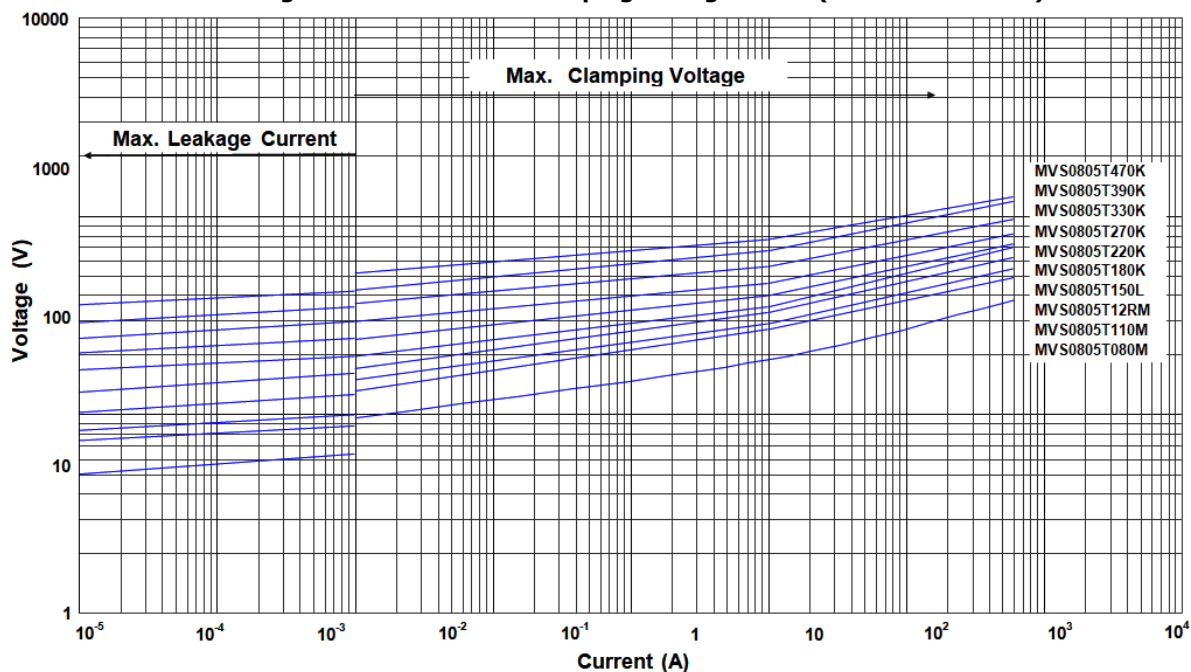
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MAX. SURGE CURRENT DERATING CURVES

Max Leakage Current and Max Clamping Voltage Curve (MVS0603T series)



Max Leakage Current and Max Clamping Voltage Curve (MVS0805T series)



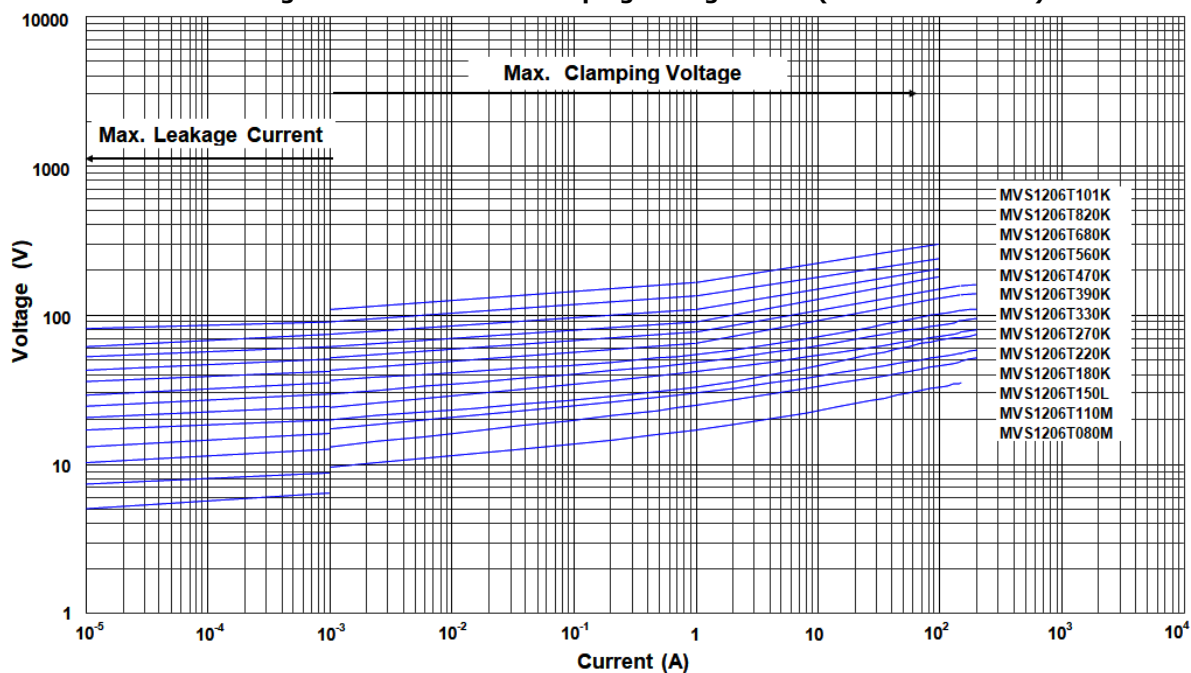
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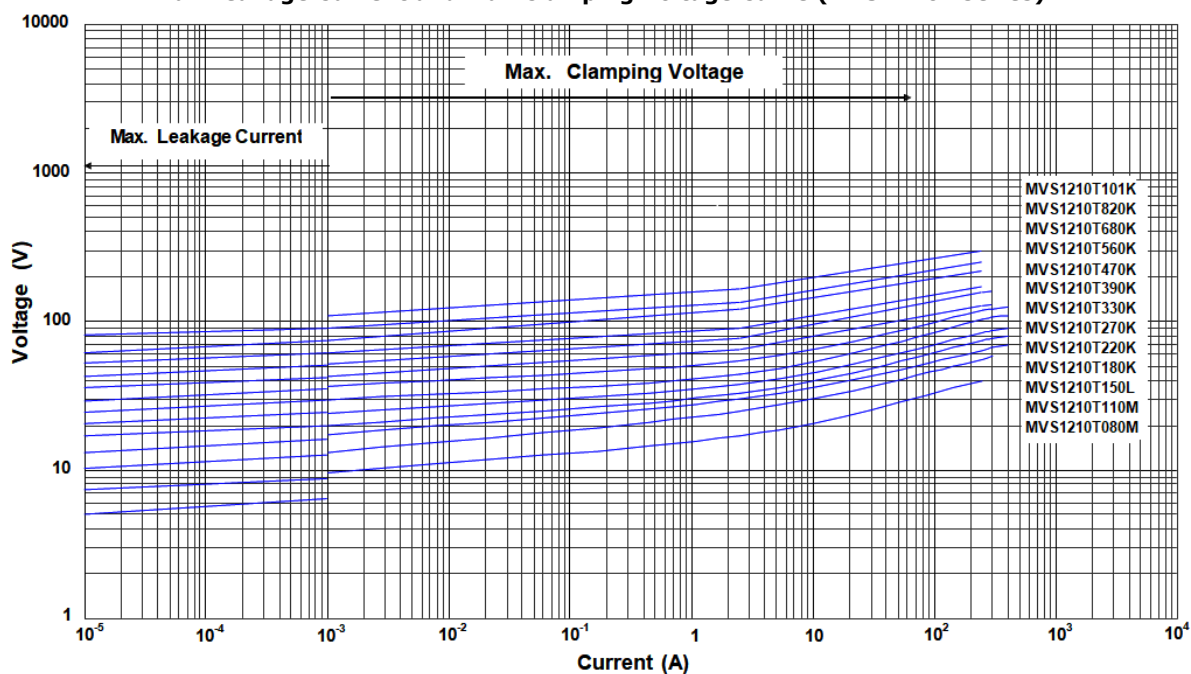
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MAX. SURGE CURRENT DERATING CURVES

Max Leakage Current and Max Clamping Voltage Curve (MVS1206T series)



Max Leakage Current and Max Clamping Voltage Curve (MVS1210T series)



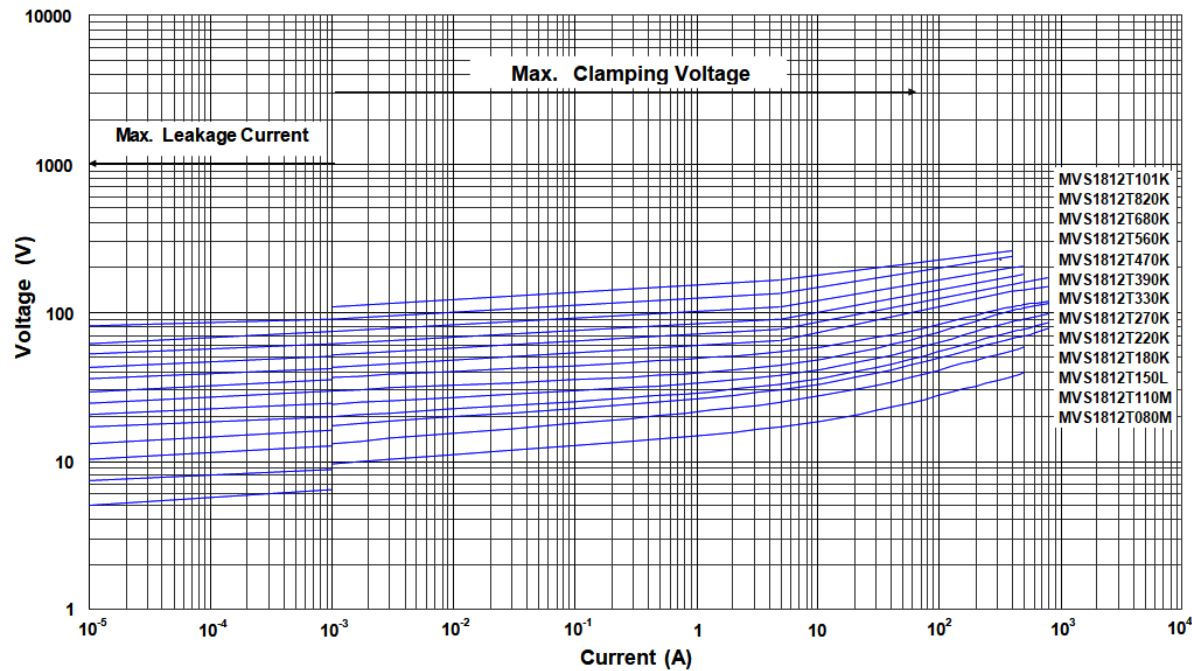
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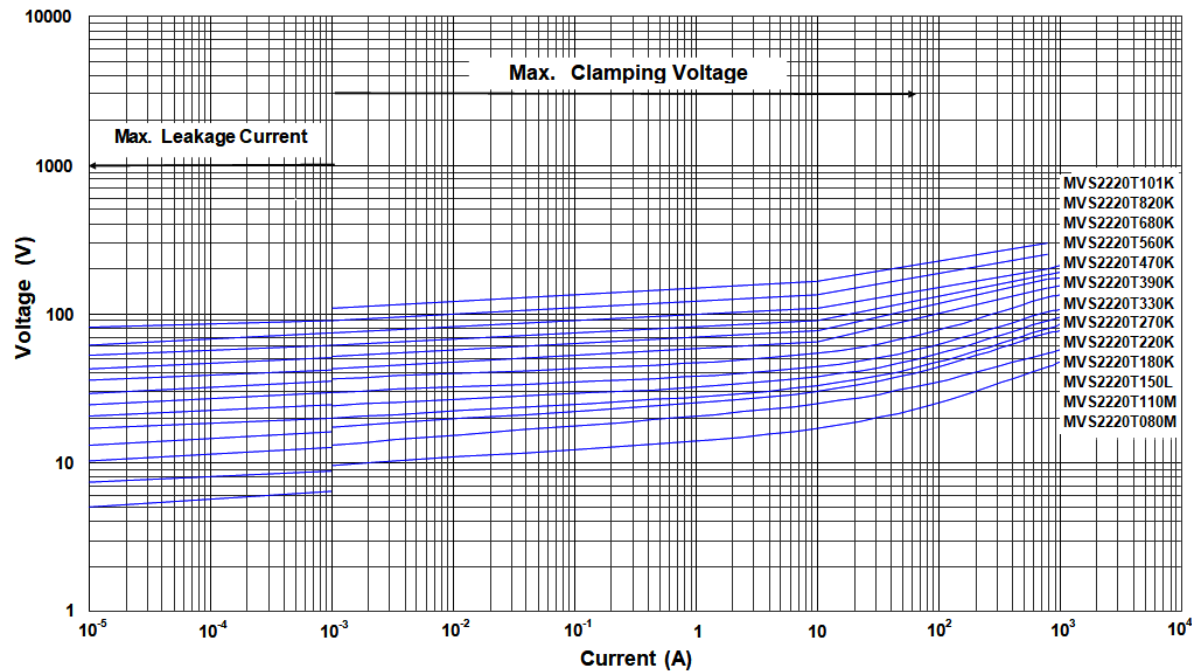
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MAX. SURGE CURRENT DERATING CURVES

Max Leakage Current and Max Clamping Voltage Curve (MVS1812T series)



Max Leakage Current and Max Clamping Voltage Curve (MVS2220T series)

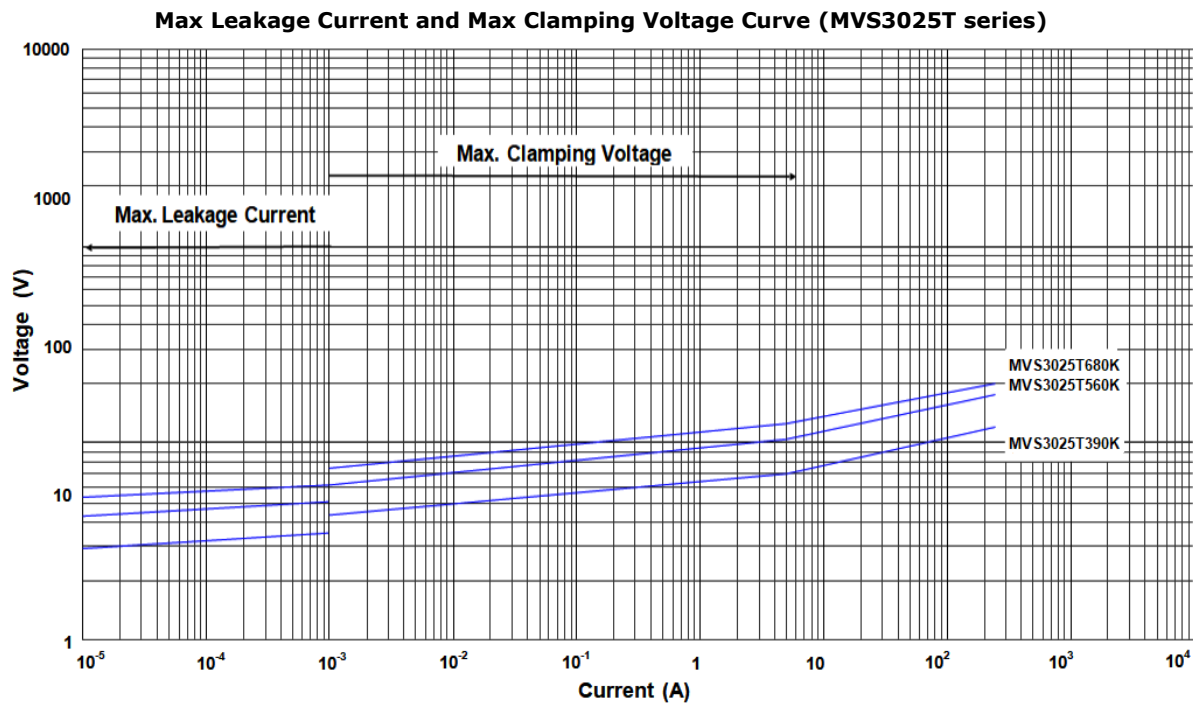


Metal Oxide Chip Varistor Surge Protection type 85°C

MVS-T Series

MERITEK

MAX. SURGE CURRENT DERATING CURVES

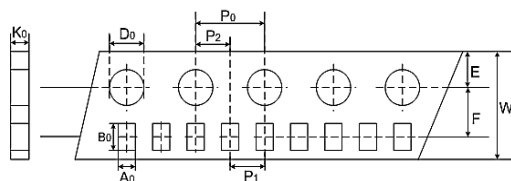


Metal Oxide Chip Varistor Surge Protection type 85°C

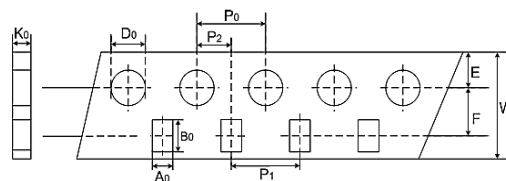
MVS-T Series

MERITEK

TAPING SPECIFICATION



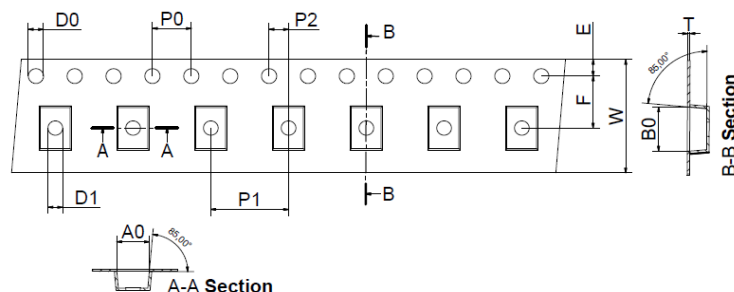
0402 series



0603 ~ 0805 series

Unit: mm

Size	A ₀ ±0.05	B ₀ ±0.12	W ±0.2	E ±0.1	F ±0.05	P ₁ ±0.1	P ₂ ±0.05	P ₀ ±0.1	D ₀ ±0.1	K ₀ ±0.1
MVS0402T	0.62	1.12	8	1.75	3.5	2	2	4	1.55	0.60
MVS0603T	1.1	1.9	8	1.75	3.5	4	2	4	1.55	0.95
MVS0805T	1.5	2.3	8	1.75	3.5	4	2	4	1.55	1.00



Unit: mm

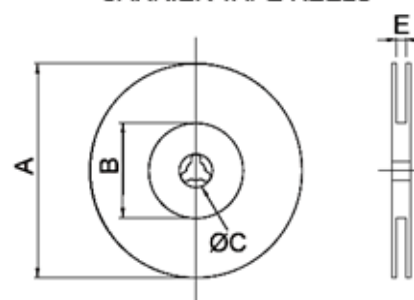
Size	A ₀ ±0.2	B ₀ ±0.2	W ±0.2	E ±0.1	F ±0.05	P ₁ ±0.1	P ₂ ±0.05	P ₀ ±0.1	D ₀ ±0.1	D ₁ ±0.1	T ±0.1
MVS1206T	1.85	3.45	8	1.75	3.5	4	2	4	1.55	1.0	0.25
MVS1210T	2.75	3.55	8	1.75	3.5	4	2	4	1.55	1.0	0.25
MVS1812T	3.65	4.96	12	1.75	5.5	8	2	4	1.55	1.5	0.25
MVS2220T	5.50	6.25	12	1.75	5.5	8	2	4	1.55	1.5	0.25
MVS3025T	6.75	8.30	16	1.75	5.5	8	2	4	1.55	1.5	0.30

TAPE CARRIER SPECIFICATION AND QUANTITY

Unit: mm

Size	A ±1	B ±0.5	C ±0.2	E ±0.5	Quantity Reel
MVS0402T	178	60	13	2.2	10000
MVS0603T	178	60	13	2.2	4000
MVS0805T	178	60	13	2.2	3500
MVS1206T	178	60	13	2.2	2500
MVS1210T	178	60	13	2.2	2500
MVS1812T	178	60	13	2.2	1000
MVS2220T	178	60	13	2.2	1000, (V1mA ≤180V)
MVS2220T	178	60	13	2.2	800, (V1mA > 180V)
MVS3025T	178	60	13	2.2	850

CARRIER TAPE REELS



*Specifications subject to change without notice.